



**SITE INVESTIGATION REPORT  
JOHNSON & JOHNSTON ASSOCIATES, INC.  
130 ROUTE 111  
HAMPSTEAD, NEW HAMPSHIRE  
NHDES# 200001038**

*Prepared For:*

**Johnson & Johnston Associates, Inc.  
130 Route 111  
Hampstead, New Hampshire**

*Prepared By:*

**CUSHING & JAMMALLO, INC.  
85 Constitution Lane  
Suite 3C1  
Danvers, Massachusetts 01923**

**Project No. 00-002**

**December 12, 2000**

## TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
EXECUTIVE SUMMARY.....	I
1.0 INTRODUCTION.....	1
1.1 Background and Purpose.....	1
1.2 Project Authorization.....	2
1.3 Scope of Services.....	2
2.0 SITE DESCRIPTION.....	3
2.1 Location and Description of Site and Surrounding Area.....	3
2.2 Current and Past Use of the Site.....	4
2.2.1 Present Site Use.....	4
2.2.2 Past Site Use.....	5
2.3 Utilities Serving Site.....	6
2.3.1 JJA Supply Wells.....	7
3.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS/CONDITIONS.....	8
4.0 FILE REVIEW INFORMATION.....	12
4.1 General.....	12
4.2 Environmental Data Resources, Inc. Database Report.....	13
4.3 New Hampshire Department of Environmental Services.....	15
4.3.1 On-Line Database Search.....	15
4.3.2 NHDES Database Report.....	16
4.3.3 NHDES File Review.....	20
4.4 Local File Review.....	29
4.4.1 Hampstead Building Inspector's, Assessor's, and Board of Health Office.....	30
4.4.2 Hampstead Town Library.....	31
4.4.3 Hampstead Fire Department.....	31
4.4.4 Atkinson Planning, Code Enforcement Office, and Board of Health.....	31
4.4.5 Atkinson Assessor's Office.....	32
4.4.6 Atkinson Fire Department.....	33
4.4.8 Kimball Public Library.....	33
5.0 APPLICABLE SOIL AND GROUNDWATER QUALITY STANDARDS / CATEGORIES	33

5.1 General.....	33
5.2 Ambient Groundwater Quality Standards.....	34
5.3 Risk-Based Standards for Groundwater and Soil.....	35
6.0 SUBSURFACE INVESTIGATION.....	35
6.1 Soil Borings, Bedrock Rock Drilling, and Monitoring Well Installations.....	36
6.2 Sampling and Analyses of Subsurface Soils and Groundwater.....	39
6.2.1 Sampling and Analyses of Subsurface Soils.....	40
6.2.2 Sampling and Analyses of Groundwater.....	41
6.2.2.1 General.....	41
6.2.2.2 Well Purging and Sampling Techniques and Devices.....	42
6.2.2.3 In-Situ and Field Analysis.....	44
6.2.2.4 Sample Containerization and Preservation.....	44
6.2.2.5 Laboratory Testing of Groundwater from Supply Wells.....	45
6.2.2.6 Laboratory Testing of Groundwater from Monitoring Wells.....	47
6.2.2.7 Quality Control Samples.....	49
6.3 Sampling And Analysis Of Septic Systems.....	50
7.0 GEOLOGY AND HYDROGEOLOGY.....	51
7.1 Regional and Site Specific Geology.....	51
7.1.1 Surficial Geology.....	51
7.1.2 Bedrock Geology.....	52
7.2 Groundwater Elevations and Estimated Direction of Groundwater Flow.....	54
8.0 CONCEPTUAL MODEL AND RISK CHARACTERIZATION.....	55
8.1 Data Analysis.....	55
8.1.1 Known and Potential Contamination Sources.....	55
8.1.1.1 Releases to the Environment at JJA.....	55
8.1.1.2 Releases to the Environment at Nearby Properties.....	56
8.1.3 Data Trends.....	57
8.1.3.1 Extent of Contamination.....	57
8.1.3.2 Occurrence of LNAPL or DNAPL.....	58
8.1.3.3 Occurrence of Natural Attenuation.....	58
8.2 Potential Receptors and Exposure Potential.....	61
8.2.1 Migration Pathways and Exposure Potential.....	61
8.2.2 Preliminary Groundwater Management Zone Boundary.....	65
9.0 CONCLUSIONS, OPINIONS, AND RECOMMENDATIONS.....	67



9.1 Conclusions .....	68
9.2 Recommendations .....	76
10.0 LIMITATIONS .....	78
11.0 REFERENCES .....	80

## **TABLES**

Table 1	Soil Boring/Monitoring Well Specifications
Table 2	Depth to Groundwater and Groundwater Elevation
Table 3	Summary of Water Quality Field Testing Results for Supply Wells
Table 4	Summary of Water Quality Field Testing Results for Monitoring Well ATC-4-2
Table 5	Summary of Water Quality Field Testing Results for Monitoring Well CJ-1
Table 6	Summary of Water Quality Field Testing Results for Monitoring Well CJ-2
Table 7	Summary of Water Quality Field Testing Results for Monitoring Well CJ-3
Table 8	Summary of Water Quality Field Testing Results for Monitoring Well CJ-4S
Table 9	Summary of Water Quality Field Testing Results for Monitoring Well CJ-4D
Table 10	Matrix of Laboratory Testing Results for Groundwater
Table 11	Summary of Laboratory Testing Results of Groundwater for VOCs
Table 12	Summary of Laboratory Testing Results of Groundwater for VOCs, Tentatively Identified Compounds
Table 13	Summary of Laboratory Testing Results of Groundwater for Natural Attenuation Parameters
Table 14	Summary of Laboratory Testing Results of Septic Systems for VOCs

## **FIGURES**

Figure 1	Site Locus Map
Figure 2	Site Plan
Figure 3	Contaminant Concentrations Identified in Groundwater
Figure 4	Groundwater Contours in Overburden Materials
Figure 5	Groundwater Contours in Bedrock

## **APPENDICES**

Appendix A	NHDES Correspondence
Appendix B	Site Investigation Scope of Work
Appendix C	Environmental Data Resources, Inc. Database Report
Appendix D	NHDES On-Line Database Listings
Appendix E	NHDES GIS Database Report
Appendix F	Selected Records Obtained from NHDES and Town Files
Appendix G	Soil Boring Logs
Appendix H	Laboratory Testing Results for Soil from Monitoring Well CJ-4S
Appendix I	Laboratory Testing Results for Groundwater and Septic Systems Sampled in June 2000
Appendix J	Laboratory Testing Results for Groundwater Sampled in July 2000

## **SITE INVESTIGATION REPORT**

**Johnson & Johnston Associates, Inc.**

**130 Route 111**

**Hampstead, New Hampshire**

### **EXECUTIVE SUMMARY**

On behalf of Johnson & Johnston Associates, Inc. (JJA), Cushing & Jammallo, Inc. (Cushing & Jammallo) performed a Site Investigation on the JJA property located at 130 Route 111, Hampstead and Atkinson, New Hampshire. The Site Investigation was:

- ◆ performed in general accordance with section 1403.07 (Site Investigation) of the New Hampshire Code of Administrative Rules Env-Wm 1403, entitled "Groundwater Management and Groundwater Release Detection Permits" (most recently published version dated February 24, 1999); and
- ◆ based on discussions with JJA; results of a meeting with the New Hampshire Department of Environmental Services (NHDES) on March 9, 2000; a Scope of Work, dated March 29, 2000, which was submitted to the NHDES by JJA and subsequently approved for implementation; and the results of report prepared for JJA by ATC Associates Inc, entitled "Limited Environmental Site Assessment", dated December 17, 1999.

The Site Investigation focused on:

- ◆ Assessing bedrock groundwater quality with field activities related to the installation of groundwater monitoring wells and the sampling and testing of groundwater;
- ◆ Evaluating the direction of groundwater flow;
- ◆ Identifying potential contamination sources, migration pathways, and receptors; and
- ◆ Providing recommendations, as appropriate and applicable, for one or more of the following:
  - ◆ Interim remedial actions to abate immediate risks, if present, or prevent the further release of contaminants;
  - ◆ Preparation of a remedial action plan in accordance with Env-Wm 1403.08;



- ◆ Additional site investigation work;
- ◆ Preliminary delineation of the groundwater management zone as defined in Env-Wm 1403.

Cushing & Jammallo's scope of work consisted of the following major elements:

- ◆ a review of available environmental reports, databases, and other pertinent documents regarding specific environmental matters at the Site and surrounding area;
- ◆ an interview with the designated Site contact to determine the general current and past operational practices at the Site;
- ◆ advancement of soil borings and bedrock drilling, and the installation of groundwater monitoring wells;
- ◆ sampling, characterizing, and field and laboratory testing of select subsurface soils;
- ◆ sampling and laboratory testing of groundwater samples collected from existing supply wells and monitoring wells; and
- ◆ a monitoring well survey and groundwater level measurements.

Based on the activities completed, Cushing & Jammallo presents the following principal findings and conclusions.

- ◆ Overburden soils at the Site overlying the bedrock appear to be relatively thin, particularly on the southeastern and southeast to east-central portion of the Site where bedrock outcrops are located. Several bedrock outcrops appear on the Site. No major structural features such as faults have been identified at or within the immediate vicinity of the Site. Thicker soils overlying bedrock exist on the western and northern portions of the Site.
- ◆ Interpretation of groundwater elevations in the overburden materials indicates that groundwater flow is generally westerly. Interpretation of groundwater elevations in the upper bedrock system indicates that groundwater flow is radial with a groundwater elevation high point located in the vicinity of monitoring well CJ-2. The groundwater high appears to coincide with a bedrock-controlled topographic high that is located in the vicinity of this well. The principal two directions of groundwater flow in this area appear to be to the northeast and the southwest.

Although the principal groundwater transport in the bedrock system is likely along fractures/joints, etc., the groundwater contours developed for the upper bedrock system do not appear to suggest fracture-directed flow.

It is likely that the overburden and bedrock groundwater contours and flow patterns presented herein may vary due to various hydraulic influences. For instance, bedrock Supply Well 1 and Supply Well 2 pump on a regular, as-needed basis. Bedrock Supply Well 1 is used intermittently for irrigation purposes. Although the radius or zone of influence of these bedrock wells is presently unknown, the potential exists for these wells, when pumping, to draw groundwater to them that otherwise would not be influenced under static or non-pumping conditions. However, the bedrock groundwater contours in the vicinity of the supply wells do not show groundwater "sinks" indicative of pumping centers.

- ◆ From a lateral perspective, groundwater contaminated with volatile organic compounds (VOCs) and nitrate in concentrations above NHDES' Ambient Groundwater Quality Standards (AGQS) and/or Method 1 GW-1 or GW-2 standards appears to be confined to the eastern portion of the Site as evidenced by their existence in Supply Well 1, Supply Well 2, ATC-2, ATC-4-2, CJ-3, CJ-4S, and CJ-4D. The Preliminary Groundwater Management Zone has been delineated in this area.

Vertically, overburden groundwater at ATC-4-2 and CJ-4S is impacted and groundwater in the upper or shallow bedrock system is impacted. The upper or shallow bedrock groundwater system is herein described as consisting of approximately the upper 30 feet of bedrock.

For the upper bedrock groundwater system, the presently defined spatial distribution of contaminants may be due, in part, to the northwest-southeast trending groundwater divide that directs groundwater flow on the eastern portion of the Site in a northeasterly direction. For the overburden groundwater system, the presently defined spatial distribution of contaminants may simply be due to the fact that no overburden groundwater sampling points are located west of impacted wells CJ-4S or ATC-4-2 except for ATC-3; overburden groundwater does not exist in some areas due to the



relatively shallow bedrock surface, or VOC contaminated groundwater does not exist on the westerly portion of the Site.

- ◆ The occurrence of VOCs in the overburden and bedrock groundwater systems appears to be in the dissolved state based upon concentrations identified to date and their solubility in water. No light non-aqueous phase liquid (LNAPL) or dense, non-aqueous phase liquid (DNAPL) has been observed to date. Further, the concentrations of the various chlorinated VOCs presently reported by the laboratory compared to their solubility limits in water do not suggest the presence of a DNAPL.
- ◆ Pumping of the bedrock supply wells at the Site may likely be (or may have in the past) spatially redistributing contaminants in the groundwater at the Site and drawing contaminated groundwater to the Site from off-Site areas. Groundwater flow patterns in the bedrock and overburden systems over time may differ (or may have differed in the past) from those presented herein based on supply well pumping schemes.

Further, it would appear that VOCs may be redistributed in the groundwater due to discharge of water pumped from the supply wells to the septic systems.

- ◆ It appears that some primary evidence of VOC degradation is occurring based on the occurrence of certain VOC in the groundwater at the Site. One or more degradation products of tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene have been identified in groundwater samples collected from the Site. However, trends in contaminant concentrations, thermal electron acceptors, and biodegradation byproducts cannot be effectively evaluated with the existing data.
- ◆ Presently, there does not appear to be an active source or sources of VOC contamination to the subsurface environment at the Site or in the immediately surrounding area. However, based upon the types of VOCs identified in the groundwater to date, the known use of various chemicals at the Site, and known and reported releases of chemicals at the Site and in immediate proximity to the Site, Cushing & Jammallo is of the opinion that there has been more than one potential source for VOCs to the groundwater systems. A source of 1,1,1-trichloroethane and trichloroethene appears to be associated with JJA. A source of methyl tert butyl ether (MTBE) appears to be associated with the former MTBE

UST that was located at Land & Sea. A source of other petroleum-related compounds such as benzene, naphthalene; 1,2,4-trimethylbenzene; and MTBE may be attributed to surface runoff from the paved parking areas that could have been impacted with minor and accidental releases of oil, gasoline, and/or diesel fuel from vehicles.

Cushing & Jammallo offers the following recommendations based upon our findings and conclusions:

1. Consideration of natural attenuation as the remedial option for the VOC contaminated groundwater at this Site. However, additional data is necessary to support this passive alternative as an effective remedial option and potentially forgo the need for the preparation of a Remedial Action Plan (Env-Wm 1403.08).

Implementation of additional rounds of groundwater sampling (using low flow sampling techniques) and testing from existing supply and monitoring wells will supply primary evidence for the existence (or absence) of natural attenuation processes. This data will be combined with the existing data. Primary evidence of natural attenuation will include concentration trends over time such as decreasing concentrations of primary VOCs, the presence and increasing concentrations of degradation products, decreasing trends in TEA (dissolved oxygen, nitrate, and sulfate) concentrations, and increasing trends in concentrations of soluble manganese, ferrous iron, and methane. Wells to be included in the monitoring program include:

- ◆ Supply Wells: JJA Supply Well 1, Supply Well 2, and Supply Well 3; Alliant supply well, and Land & Sea supply well (note that the Land & Sea supply well has not previously been a part of the sampling program instituted by JJA. Water from JJA Supply Wells 2 and 3 should be sampled prior to the water from these wells being subjected to their respective treatment systems.
- ◆ Monitoring wells: ATC-2, ATC-3, ATC-4-2, CJ-1, CJ-2, CJ-3, CJ-4S, and CJ-4D.

Recommended groundwater sampling frequency and testing parameters are as follows:



- ◆ Sampling over a period of two years with the sampling intervals or frequency being three times per year (total of six sampling rounds);
- ◆ Testing parameters shall consist of the following:

- ◆ Field testing of pH, temperature, specific conductance, dissolved oxygen and oxidation-reduction potential;
- ◆ Laboratory testing of VOCs by EPA Method 8260B. It is not recommended that TICs be evaluated during these additional testing rounds since the concentrations of previously identified TICs appear to be relatively low, where quantified or estimated, and no NHDES standards exist for the identified TICs; and
- ◆ Laboratory testing of nitrate, sulfate, methane, ferrous iron, soluble manganese, chloride, and total organic carbon.

The depth to water in each monitoring well should be measured, recorded, and converted to groundwater elevations for each sampling round. Groundwater contour maps should be prepared and the Groundwater Management Zone limits should be re-evaluated for at least three of the six sampling rounds, including rounds that reflect low and high groundwater levels, to evaluate flow patterns in the overburden and bedrock groundwater systems.

2. Sampling and testing of water that discharges from internal faucets at JJA's Operations Building where the likelihood exists for JJA employees to come in contact with VOC impacted water and volatilization of VOCs from the water. Laboratory testing of samples should consist of VOCs by EPA Method 8260B. Subsequent to this testing, the results should be evaluated for risks to human health.

3. Performance of a Risk Characterization in accordance with the NHDES' "Risk Characterization and Management Policy" to evaluate the risk of harm to human health and the environment that exists at the Site due to the contaminants in the groundwater. The Risk Characterization should be performed subsequent to the completion of recommendations 1 and 2 above. The results should be used to evaluate how any risks will be addressed, to determine if additional response actions are necessary, and whether



remedial action, other than a natural attenuation alternative, is necessary.

# **SITE INVESTIGATION REPORT**

**Johnson & Johnston Associates, Inc.  
130 Route 111  
Hampstead, New Hampshire**

## **1.0 INTRODUCTION**

### **1.1 Background and Purpose**

On behalf of Johnson & Johnston Associates, Inc. (JJA), Cushing & Jammallo, Inc. (Cushing & Jammallo) has prepared this document presenting the findings of a Site Investigation performed on the JJA property located on Route 111, Hampstead and Atkinson, New Hampshire. The Site Investigation was:

- ◆ performed in general accordance with section 1403.07 (Site Investigation) of the New Hampshire Code of Administrative Rules Env-Wm 1403, entitled "Groundwater Management and Groundwater Release Detection Permits" (most recently published version dated February 24, 1999); and
- ◆ based on discussions with JJA; results of a meeting with the NHDES on March 9, 2000; a Scope of Work, dated March 29, 2000, which was submitted to the NHDES by JJA and subsequently approved for implementation; and the results of report prepared for JJA by ATC Associates Inc, entitled "Limited Environmental Site Assessment", dated December 17, 1999.

ATC's report presented the results of a subsurface investigation that included the advancement of soil borings, bedrock coring, the installation of monitoring wells, and sampling and testing of soil and groundwater. That report identified one or more volatile organic compounds (VOCs) in groundwater from JJA's on-site supply wells and monitoring wells in excess of NHDES' Ambient Groundwater Quality Standards (AGQS) as noted in Table 1403-1 of the New Hampshire Code of Administrative Rules Env-Wm 1403. In accordance with section 1403.07 of the administrative rule and subsequent to the notification of this condition to the NHDES, a "Site Investigation" shall be implemented to "...investigate

the site and the off-site surrounding area for possible impacts of the contamination. ..." by "...determining the location and full extent of contamination and identifying receptors and potential receptors..."

In a letter dated January 24, 2000 (Appendix A), JJA provided notification to the NHDES that certain NHDES AGQS had been exceeded. JJA also provided the NHDES with a copy of ATC's December 17, 1999 report as documentation of its efforts to date. The NHDES provided confirmation of the receipt of JJA's notification in a letter to JJA dated February 25, 2000 (Appendix A) and assigned the following number to this site: **DES #200001038**.

### **1.2 Project Authorization**

This Site Investigation was conducted in accordance with Cushing & Jammallo's proposal to JJA dated March 29, 2000, and the Statement of Terms and Conditions included with that proposal. The Scope of Work included in that proposal was submitted to the NHDES for review prior to initiating work.

Authorization from JJA to proceed with the work was based on a letter to JJA from the NHDES, dated May 17, 2000 (Appendix A), indicating that the Proposal for Site Investigation was "...acceptable for implementation ..." and receipt of the executed proposal from JJA. The letter also requested that JJA provide a date by which the Site Investigation Report was expected to be submitted to the NHDES. JJA responded with a letter to the NHDES dated June 1, 2000 in which JJA presented a proposed schedule for the major task items of the Site Investigation (Appendix A).

### **1.3 Scope of Services**

ATC's December 1999 report revealed that the principal contamination (contaminants with concentrations exceeding NHDES standards) was halogenated VOCs limited to groundwater in the vicinity of the Operation Building. Further, the NHDES notified JJA in its letter of February 25, 2000 that the Ambient Groundwater Quality Standard for methyl-tert-butyl-ether (MTBE) was recently revised from a concentration of 70 micrograms per liter (ug/l) published in its most recent version of Env-Wm 1403 to 13 ug/l. A comparison of the lower MTBE standard of 13 ug/l to the concentrations of MTBE reported by the laboratory in groundwater



samples described in ATC's report reveal that the MTBE standard had also been exceeded, specifically in Supply Well 1 and Supply Well 2.

Based upon this information, the Site Investigation focused on:

- ◆ Assessing bedrock groundwater quality with field activities related to the installation of groundwater monitoring wells and the sampling and testing of groundwater;
- ◆ Evaluating the direction of groundwater flow;
- ◆ Identifying potential contamination sources, migration pathways, and receptors; and
- ◆ Providing recommendations, as appropriate and applicable, for one or more of the following:
  - ◆ Interim remedial actions to abate immediate risks, if present, or prevent the further release of contaminants;
  - ◆ Preparation of a remedial action plan in accordance with Env-Wm 1403.08;
  - ◆ Additional site investigation work;
  - ◆ Preliminary delineation of the groundwater management zone as defined in Env-Wm 1403.

The Scope of Work for the Site Investigation, as submitted to the NHDES, is presented in Appendix B. Slight modifications were made to this scope during the course of its implementation. These modifications are discussed in this document.

## **2.0 SITE DESCRIPTION**

### **2.1 Location and Description of Site and Surrounding Area**

The area subject to this investigation was focused on specific portions of the JJA property located in Hampstead, New Hampshire and Atkinson, New Hampshire, north of Route 111 and west of Hill Pond. The portion of the property located in southwestern Hampstead, New Hampshire consists of 2.298 acres of land (Map 6, Lot 64). The immediately adjacent portion of the property in northwestern Atkinson, New Hampshire consists of 5.471 acres of land (Map 21, Lot 4-1) (as shown on Sheet 2, Site Development Plan, prepared by MHF Design Consultants, Inc. for JJA, revised on June 25, 1998). One 15,000 square foot building

(initially built in 1984) and recent addition (year 2000) exists on Lot 64 in Hampstead and one 37,200 square foot warehouse building (completed in 1999) exists on Lot 4-1 in Atkinson. The Hampstead/Atkinson Town boundary is oriented northwest-southeast and splits the operation and warehouse building. The buildings are physically connected via two east-west oriented, enclosed walkways. A landscaped "courtyard" is located between the two buildings. Refer to Figure 1 for the regional location of the Site and Figure 2 for the general Site layout.

The approximate latitude and longitude coordinates for the Site are 42° 51' 29" north and 71° 11' 02" west, respectively; the approximate Universal Traverse Mercator (UTM) coordinates are 4747373 mN and 321576 mE. The regional location of the Site is illustrated on Figure 1 that is a copy of a portion of the U. S. Geological Survey (USGS) topographic map for the Haverhill, Massachusetts Quadrangle (1985).

The area of the property subject to this investigation was focused on the developed area of these two lots and is hereinafter referred to as the Site.

The Site is immediately bordered to the north by forested land and wetlands, to the south by Route 111 beyond which is undeveloped land, to the east by Alliant Specialty Metals (Alliant Metals), and to the west by forested land.

## **2.2 Current and Past Use of the Site**

### **2.2.1 Present Site Use**

Two buildings, as described in the previous section, presently occupy the Site. One 15,000 square foot, two-story building exists on Lot 64 in Hampstead, New Hampshire and one 37,200 square foot warehouse building exists on Lot 4-1 in Atkinson, New Hampshire. These buildings are connected via two east-west oriented, enclosed walkways. The present 15,000 square foot building, when rebuilt subsequent to a fire that occurred in January 1990, initially consisted of a 15,000 square foot structure used for office space and manufacturing operations. In June 2000, JJA constructed a 4,800 square foot addition to the eastern portion of this building. JJA plans to expand there manufacturing operations in this addition.



The 37,200 square foot building on Lot 4-1 in Atkinson, New Hampshire was erected in 1998 and first occupied in January 1999 and is used primarily for warehousing by JJA. This building also contains offices along the southern and western interior portions of the building. Neither building has a basement.

JJA manufacturers laminated aluminum/copper sheets for the electronics industry. Manufacturing takes place in the Operations Building. The laminated aluminum/copper sheets are made from aluminum rolls that are sent through a vapor degreaser. A tacky roll is then used to remove debris and particulate matter. An epoxy is then applied to the aluminum and then copper is pressed onto the top and bottom of the aluminum surface. The laminated product is then cleaned, cut, stacked, and wrapped.

Although 1,1,1-trichloroethane (1,1,1-TCA) was used by JJA for the process in the past, the degreasers presently use trichloroethene (TCE). Trichloroethene is presently stored in one 330-gallon above ground tank located within the northerly interior area of the Operations Building along the northerly interior wall. In the recent past, trichloroethene was also stored in a 275-gallon, oval above ground tank (surrounded by a spill containment structure) located within the northerly interior of the Operations Building along its easterly interior wall. The coating process uses Dexter #JJA-4, which is a proprietary compound. Frekote, another proprietary compound, was previously used for this purpose.

Hazardous wastes generated by JJA are stored by JJA in the vicinity of the 330-gallon trichloroethene tank within the northerly interior of the Operations Building. According to Mr. Bean, small quantities of coating materials are stored either in a flammable storage cabinet within the northerly portion of the operations building or within a flammable storage shed located within the "courtyard" between the operations and the warehouse building.

### **2.2.2 Past Site Use**

According to information provided by JJA, operations at the present address of 130 Route 111 began in January 1984. At that time, the original Operations Building was erected and occupied. From 1975 to late 1984, JJA's operations were located in North Billerica,



Massachusetts. Prior to that time, operations were located in a home in Billerica, Massachusetts. The operations that took place at North Billerica and Billerica, Massachusetts were not necessarily that same as those at the present Site.

### **2.3 Utilities Serving Site**

The Site is serviced by electrical power supplied by the Public Service of New Hampshire. Electrical service to the Operation Building enters the Site on overhead utility poles to the east of the building. From the utility pole, electrical service lines are directed underground to the building and the pad-mounted transformer that exist just east of the building.

The buildings are heated with propane gas. The propane gas tanks are located above ground on the northeastern portion of Lot 64 and on the western portion of Lot 4-1. Propane is piped to the buildings via underground piping.

Bottled water is supplied by JJA throughout the operations building and the warehouse for potable water.

Hydrants are located on the JJA property. These hydrants receive water from JJA Supply Well 1 and Supply Well 2.

Stormwater catch basin drains were observed at various locations throughout the Site. These basins direct runoff to either the wetland area north of the operations building or to detention ponds located on Lot 4-1.

Municipal sanitary sewer service is not provided by either Town. Instead, domestic sewage is directed to two subsurface sanitary leach fields on the Site. One chamber leaching field, which replaced the original system, also located in this area, exists southeast of the operations building. This system accepts sanitary wastes from the Operations Building. The other system, also a chamber system, exists west of the Warehouse Building which it serves.

### 2.3.1 JJA Supply Wells

Three supply wells are located on Site (Figure 2). According to Mr. Bean, none of the wells is used for drinking water. Supply Well 1, which was the first well to be installed, is located immediately east of the Operations Building and is only used to for landscape irrigation. Supply Well 2 is located directly beneath the floor of the southern enclosed walkway that connects the two buildings. Supply Well 3, the newest of the wells, is located north of the warehouse building. Both Supply Well 2 and 3 supply water to the buildings' sinks and toilets. According to Mr. Bean, water from all three of the wells contains high iron concentrations.

Little information is presently known as to the construction or water supply specifications of these wells (i.e., total well depth, depth to bedrock, depth of casing, water yielding zones, safe yield). Cushing & Jammallo queried several bedrock water well drillers in the area and the New Hampshire Water Resources Board at the NHDES but was unable to acquire additional information on this matter. However, JJA and those companies that provide treatment systems for the JJA supply wells did provide the following information.

No treatment system is presently provided for Supply Well 1, since it is used solely for irrigation.

Both Supply Well 2 and 3 have systems to treat iron. The treatment system for Supply Well 2 is located within the western portion of the Operations Building. According to Policy Well and Pump of Windham, New Hampshire, the most recent treatment system for this well was installed in September 1998 and consists of:

- ◆ one water conditioner (ion-exchange process) to control iron, manganese, and hardness;
- ◆ one sand filter;
- ◆ two neutralizers consisting of a calcium corosex mixture for pH adjustment; and
- ◆ one aeration filter to remove hydrogen sulfide.



Policy Well and Pump also indicated that this well has a one horse power Goulds pump capable of pumping 18 gallons per minute (gpm) that is set in the well at a depth of 100 feet.

The treatment system for Supply Well 3 is located within the northwestern portion of the Warehouse Building. According to Mr. Rick Faxon of Faxon Well and Pump, this system treats water pumped from the well as follows. Water firstly passes through two aeration tanks. It then flows to two holding tanks. Via a piping manifold, water then enters two reactors (iron filters) and then on to a 20-inch diameter sediment tank. From this point, water is discharged to two endpoints, the outside irrigation system and/or the toilets and sinks within the Warehouse Building, after it flows through a water softener.

According to Windham Well, Supply Well 3 has a one horse power pump set at a depth of 205 feet capable of pumping 25 gpm.

Figure 2 presents some of the on-Site utilities as they presently exist.

### **3.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS/CONDITIONS**

JJA provided information concerning previous environmental investigations of the Site to Cushing & Jammallo. This information consisted of the following reports or portions thereof. Information presented in the reports is summarized below in ascending chronological order.

- ◆ IES, Inc., December 5, 1988. "Chapter 147-A Site Evaluation, 130 Route 111, Hampstead, New Hampshire, prepared for Johnson & Johnston Associates, Inc.

IES performed the investigation to "...address and explain any potential problems pursuant to New Hampshire State Environmental Laws including R.S.A. Chapter 147" and "...all aspects of Massachusetts General Law Chapter 21-E". IES' assessment consisted of an historical review, research of state and local files, and interviews with public officials. The results of IES' work indicated "...that the subject site [did] not exhibit a disposal problem pursuant to New Hampshire or Massachusetts Environmental Laws governing oil and hazardous materials..."

IES noted an "incident" at JJA in June 1987 "...when a pipe broke in the cooling jacket of the vapor degreaser. The cooling water mixed in with the solvent necessitating the removal of all the liquid by General Chemical". IES reported, however, that "...none of the liquid was released at that time..." The manifests that IES provide in the report indicate that 550 gallons of waste 1,1,1-trichloroethane was transported to General Chemical in Framingham, Massachusetts and 330 gallons of a combination of waste trichlorotrifluoroethane, isoparaffinic hydrocarbon, and dibutyl ethyl was transported to Solvent Recovery Service of New England in Southington, Connecticut.

IES described a release of "...approximately 100 gallons of diesel fuel from a leaking semi-tractor saddle tank in June 1987" that occurred at the loading dock of the building located on the easterly abutting property to JJA. The spill reportedly was "...mostly contained in the paved loading dock area" and "...no subsurface areas were affected..."

IES also noted that in June 1987, a representative from the Town of Hampstead inspected the JJA property and "...noted a number of empty barrels to the rear of the property. Some of the barrels were marked as waste 1,1,1-trichloroethane". IES further noted that "...storage of the barrels has been moved inside the building...since that time".

- ◆ Geotechnical Services, Inc., October 1993. "Environmental Site Assessment Report, Lot 4, Tax Map 21, Atkinson, New Hampshire", prepared for Johnson & Johnston Associates, Inc.

The stated purpose of this study was to "...assess the probability of hazardous wastes, oils, or gasoline having been improperly stored at the site" and how "...the environmental conditions at the site ...[pertained] to the New Hampshire RSA: 146 and 147". Geotechnical Services performed a site reconnaissance, a review of the available environmental history of the site and its general geographic area, a limited ownership history, and a visual assessment of the site. It was Geotechnical Services "...opinion that hazardous wastes, oils, or gasoline have not been improperly stored or disposed of on the site..." at the time of its investigation.

Geotechnical Services notes that on October 10, 1993, JJA reported an incident involving the release of 1,1,1-trichloroethane that occurred on October 16, 1989. According to the incident report prepared by Service Chemical Corp. and dated October 16, 1989, 15 to 20 gallons of 1,1,1-trichloroethane was released to a storm drain located beneath the delivery truck. JJA has indicated



that the storm drain in question was located immediately adjacent to monitoring well ATC-2 that was installed by ATC in November 1999. The storm drain discharges to the wetland located north of the Operations Building. When the chemical was being transferred from the truck to the storage tank located inside the building, a gasket came loose inside the transfer hose, producing the leak. Service Chemical Corp. cleaned "waste sludge" out the 8-inch diameter sump located inside the drain, collected samples from the "end of the drain pipe", and submitted the samples to a laboratory for testing. One 55-gallon drum of "waste sludge from the sump was generate, labeled and marked". No 1,1,1-trichloroethane was indicated in the testing results. The NHDES was contacted and they "suggested flushing the drain to remove any additional contamination". This task was performed on the same day and generated "two drums of wastewater". Two additional effluent samples were collected and analyzed at a laboratory. The incident report states that "again no contamination was found".

- ◆ IVI Environmental, Inc., June 17, 1998. "Phase I Environmental Site Assessment", prepared for GMAC Commercial Mortgage, New York, New York.

The purpose of IVI's work was to "...assess current site conditions [on the JJA property] and render an opinion as to the presence of recognized environmental conditions on or beneath the surface..." in accordance with The American Society for Testing Materials (ASTM) publication E1527-97. IVI's assessment "...revealed no evidence of recognized environmental conditions..." However, IVI did identify two federally regulated wetlands located on the JJA property and stated that "...further site development and on-site activities which may disturb the wetlands may be limited by federal, state, or local regulations pertaining to wetlands". IVI refers to both the IES and Geotechnical Services reports that identify the 100-gallon diesel fuel release on the adjacent property that occurred in June 1987 and the release of 1,1,1-trichloroethane in 1989 on the JJA property, respectively.

- ◆ ATC Associates Inc., December 17, 1999. "Limited Environmental Site Assessment", prepared for JJA.

The objective of the ATC's work was to perform a limited environmental site assessment of the subsurface environment focusing on 1) specific areas of the Site where releases of oil and/or hazardous materials were known to have occurred, 2) those areas that receive subsurface discharges of sanitary wastes, and 3) other representative portions of the Site.



This objective was accomplished by characterizing the quality of the subsurface soils and groundwater at those areas of concern. ATC's scope of work consisted of a review of available environmental reports and other pertinent documents regarding previously conducted assessments and/or investigations on the Site as provided to ATC by JJA and its legal counsel; an interview with the designated Site contact to determine the general current and past operational practices at the Site; advancement of nine soil borings (ATC-1, ATC-2, ATC-2, ATC-4A, ATC-4B, ATC-4C, ATC-4D, ATC-4-1, and ATC-4-2) and one bedrock core at location (ATC-2), installation of four groundwater monitoring wells (within borings ATC-2, ATC-3, ATC-4-1, and ATC-4-2); sampling and laboratory testing of select subsurface soils for volatile organic compounds (VOCs); sampling and laboratory testing of groundwater samples collected from JJA's non-potable supply wells and monitoring wells for VOCs; and a monitoring well survey and groundwater level measurements. The locations of these borings and wells are presented on Figure 2 herein.

ATC compared the soil testing results to the standards established for soil category NH S-1 of the Method 1 Soil standards (Table 3) published in the NHDES document entitled "Contaminated Sites Risk Characterization and Management Policy", dated January 1998. Testing results revealed no VOCs above the laboratory's applicable method reporting limits (MRL) for samples collected from borings ATC-1, ATC-1D (duplicate of ATC-1), ATC-2, and ATC-4B and the associated trip blanks. However, three VOCs were reported by the laboratory above its applicable MRLs for the soil sample collected from ATC-3. These compounds were toluene at a concentration of 0.76 milligrams per kilogram (mg/kg), isopropylbenzene at a concentration of 0.083 mg/kg, and 4-isopropyltoluene at a concentration of 1.20 mg/kg. The reported concentrations of toluene (0.76 mg/kg) and isopropylbenzene (0.083 mg/kg) are below the applicable NHDES Method 1 standards for soil category S-1 of 100 mg/kg and 123 mg/kg, respectively. ATC noted that the NHDES did not have an established S-1 standard for 4-isopropyltoluene. However, the standard for 4-isopropyltoluene is presented for a group of compounds known as alkylbenzenes, which has a S-1 standard of 59 mg/kg. The concentration of 4-isopropyltoluene was reported below this S-1 standard.

ATC compared the groundwater testing results to the AGQS presented in the NHDES document entitled "Groundwater Management and Groundwater Release Detection Permits", New Hampshire Code of Administrative Rules Env-Wm 1403. Testing results revealed that no VOCs were identified at or above the laboratory's applicable MRLs for water from Supply



Well 3, ATC-3D (which is a duplicate of ATC-3), or the associated trip blanks. However, one or more VOCs were reported by the laboratory in groundwater from the following samples: Supply Well 1, Supply Well 1D, Supply Well 2, ATC-2, ATC-3, and ATC-4 (also known as ATC-4-2). The concentrations of 1,1-dichloroethene (1,1-DCE) in Supply Well 1 [22 micrograms per liter (ug/l)], Supply Well 1D (duplicate of Supply Well 1) (22 ug/l), Supply Well 2 (9.9 ug/l), and ATC-2 (58 ug/l); 1,1-dichloroethane (1,1-DCA) in ATC-2 (300 ug/l); and trichloroethene in ATC-4 (9.1 ug/l), as reported by the laboratory, are in excess of the NHDES AGQS. At the time ATC produced its report, the NHDES AGQS for methyl-tert-butyl ether (MTBE), as presented in February 24, 1999 version of "Groundwater Management and Groundwater Release Detection Permits" was 70 ug/l. However, the NHDES subsequently notified JJA that the AGQS had been recently reduced to 13 ug/l. Therefore, this new MTBE standard of 13 ug/l was exceeded in Supply Well 1 (17 ug/l), Supply Well 1D (duplicate of Supply Well 1) (17 ug/l), and Supply Well 2 (23 ug/l).

#### **4.0 FILE REVIEW INFORMATION**

##### **4.1 General**

As part of its research for environmental-related matters concerning the Site, Cushing & Jammallo reviewed and/or obtained information from a private environmental database search company, and a number of private and municipal/state agency sources.

A federal and state records review was accomplished through a computer database search of facilities, which appear on a series of government lists. The database search was performed for Cushing & Jammallo by Environmental Data Resources, Inc. (EDR). Cushing & Jammallo also performed a database search through the NHDES web site and at the NHDES utilizing their GIS system. These database searches yielded information that was used to perform a review of files of selected sites maintained by the NHDES.

Local sources of information included the:

- ◆ Town of Hampstead Building Inspector Office;
- ◆ Town of Hampstead Assessor's Office;
- ◆ Town of Hampstead Board of Health Office;

- ◆ Hampstead Town Library;
- ◆ Hampstead Fire Department;
- ◆ Town of Atkinson Code Enforcement Office;
- ◆ Town of Atkinson Planning Office;
- ◆ Town of Atkinson Board of Health; and
- ◆ Kimball Public Library in Atkinson.

Cushing & Jammallo also visited the NHDES office in Concord, New Hampshire to review available files and perform a database search.

#### **4.2 Environmental Data Resources, Inc. Database Report**

To identify environmental information about the Site and surrounding area, Cushing & Jammallo contacted EDR and performed an on-line database search of available federal and state informational sources. EDR maintains a database of environmental records from a variety of state and federal listings. Cushing & Jammallo requested that the approximate search distances from the subject Site be set at the standard distances set forth in section 7.2.1.1 of the American Society for Testing Material (ASTM) document E1527-97 entitled "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process". Environmental record sources searched by EDR and the approximate search distances from the subject Site included:

- ◆ U.S. Environmental Protection Agency (U.S. EPA) Federal National Priority List (NPL) Superfund Sites (1.0 mile);
- ◆ U.S. EPA Delisted NPL (1.0 mile);
- ◆ U.S. EPA Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) (0.5 mile);
- ◆ U.S. EPA CERCLIS-No Further Remedial Action Planned (CERCLIS-NFRAP) (0.25 mile);
- ◆ U.S. EPA Corrective Action Report (CORRACTS) (1.0 mile);
- ◆ U.S. EPA/National Technical Information Service (NTIS) Resource Conservation and Recovery Information System (RCRIS) (0.25 to 0.5 mile);
- ◆ U.S. EPA/NTIS Emergency Response Notification System (ERNS) (target Site only); and



- ◆ NHDES State Hazardous Waste Sites (SHWS) (1.0 mile);
- ◆ NHDES Solid Waste Facilities/Landfill Sites (LF) (0.5 mile);
- ◆ NHDES Leaking Underground Storage Tank Incident Reports (LUST) (0.5 mile); and
- ◆ NHDES Registered Underground Storage Tanks (UST) (0.25 mile).

EDR also utilities supplemental Federal and State records including:

- ◆ U.S. EPA Superfund (CERCLA) Consent Decrees (CONSENT) (1.0 mile);
- ◆ National Technical Information Service Records of Decision (ROD) (1.0 mile);
- ◆ U.S. EPA Facility Index System/Facility Initiative Summary Report (FINDS) (target Site only);
- ◆ U.S. Department of Transportation Hazardous Materials Information Reporting System (HMIRS) (target Site only);
- ◆ Nuclear Regulatory Commission Material Licensing Tracking System (MLTS) (target Site only);
- ◆ U.S. Department of Labor Mines Master Index File (MINES) (0.25 mile);
- ◆ U.S. EPA Federal Superfund Liens (NPL LIEN) (target Site only);
- ◆ PCB Activity Database System (PADS) (target Site only);
- ◆ RCRA Administrative Action Tracking System (RAATS) (target Site only);
- ◆ U.S. EPA Toxic Chemical Release Inventory System (TRIS) (target Site only);
- ◆ U.S. EPA Toxic Substances Control Act (TSCA) (target Site only);
- ◆ NHDES Registered Aboveground Petroleum Storage Tank Database (AST) (target Site only);
- ◆ NHDES Leaking Aboveground Storage Tank Incident Reports (LAST) (target Site only); and
- ◆ NHDES Spills (SPILLS) (target Site only).
- ◆ Former Manufactured Gas Sites (1.0 mile)

EDR reported that the Site "...was not listed in any of the databases searched..." and that "...that no mapped sites were found in [its] search of available (reasonably ascertainable) government records either on the [Site] or within the ASTM E 1527-97 search radius around the [Site]..." for the database noted above. Further, EDR noted that it reviewed a collection

of Sanborn Fire Insurance maps, however, "...fire insurance maps depicting the target property...were not identified."

A copy of the EDR database report is included in Appendix C.

#### **4.3 New Hampshire Department of Environmental Services**

Cushing & Jammallo performed various searches of data and information available through the NHDES, including an on-line database search of various listings and a database search at the NHDES offices using the available NHDES GIS system. The following discussion summarizes the results of these efforts.

##### **4.3.1 On-Line Database Search**

Cushing & Jammallo performed an on-line search of available environmental databases through the NHDES website. Three different listings were obtained (Appendix D). Information supplied in these listings is summarized below.

##### ***Site Remediation and Groundwater Hazard Inventory***

Two lists were available under the Site Remediation and Groundwater Hazard Inventory. One of these, updated as of August 2, 2000, was the "Listing of All Initial Response Oil Spill Projects" for incident dates between January 1, 1995 and August 2, 2000. This database revealed that there were no sites listed for Atkinson and four sites listed for Hampstead. Of the four sites listed in Hampstead, three were located at distances of greater than 0.5 mile from the Site. One site, however, Alliant Metals, located at 135B Route 111 just east of the Site, was listed as having a spill of 100 gallons of No. 2 fuel oil on October 25, 1999.

The second listing, "Listing of All Sites" also updated as of August 2, 2000, was searched specifically for both Atkinson and Hampstead, New Hampshire. A total of thirteen sites were listed in Atkinson. Of these listings, four of the sites are considered closed by the NHDES. The balance of the sites that are still active are considered to be at a far enough distance from the Site so as not to pose an environmental impact to the Site.



For the Town of Hampstead, New Hampshire, thirty-nine sites are listed of which eighteen are considered closed by the NHDES. JJA is on this list (Site #200001038) relative to the January 24, 2000 notification that JJA provided to the NHDES as described in Section 1.1 herein. The only other site within 0.5 mile of JJA is Land and Sea, Inc. located at 138 Route 111. Land and Sea's assigned DES site number is 199706031. No other site is located within 0.5 mile of JJA.

#### *Underground Storage Tank Registration Listing*

A total of six sites have one or more registered underground storage tanks (USTs) listed as being located in Atkinson, New Hampshire. All of these sites are considered to be at distances far enough from the subject Site so as not to pose an environmental impact to the Site.

A total of nineteen sites have one or more registered USTs listed as being located in Hampstead, New Hampshire. Land and Sea, Inc. which is located at 138 Route 111 and within approximately 500 feet of the Site, is listed as having removed a steel, 1,000-gallon UST, that contained a hazardous substance, on September 11, 1996. The only other listed UST located within 0.5 mile of the Site is a 1,000-gallon steel tank at Contech Plastics that was used to store diesel fuel. This tank was reportedly removed on January 1, 1993. Contech Plastics is located on the northern side of Route 111, approximately 2,400 feet northeast of the Site. All of these USTs, except for the UST located at Land and Sea, are considered to be at distances far enough from the subject Site so as not to pose an environmental impact to the Site. The UST at Land and Sea is discussed further in Section 4.3.3.

#### **4.3.2 NHDES Database Report**

On May 15, 2000, Cushing & Jammallo performed a database search at the NHDES offices using the available NHDES GIS system. A total of seven databases were investigated at search distances within a radius of one mile from the subject Site. These databases included:

- ◆ Groundwater Hazards Inventory;
- ◆ Junkyard Inventory;
- ◆ Public Water Supply Inventory;
- ◆ RCRA Inventory;
- ◆ Source Water Protection Area;
- ◆ Underground Storage Tank Inventory; and
- ◆ Water Well Inventory.

The GIS Database report is presented in Appendix E and includes a map showing the listed sites within a one mile radius of JJA. Available information in each of these databases, as of May 15, 2000, is summarized below.

#### *Groundwater Hazards Inventory*

Although produced at a different date, this inventory is the same as that of the Listing of All Sites noted above that was available on the NHDES web site. This inventory lists Land and Sea (DES site #199706031). No other listing under this category is located within a 0.5 mile radius of JJA.

#### *Junkyard Inventory*

No junkyards are noted by the NHDES as being located within a 1.0 mile radius of JJA.

#### *Public Water Supply Inventory*

A total of 15 public water supplies are noted by the NHDES as being located within a 1.0 mile radius of JJA. Of these fifteen public water supplies, seven are located within a 0.5 mile radius of JJA. The public water supply systems include:

- ◆ Water Wheel Estates located on Water Wheel Estates Road in Atkinson, New Hampshire: This public water supply system consists of two water wells (PWS ID#0112070-001 and #0112070-002), each with a well depth of 200 feet.
- ◆ Atkinson Woods located on Lakeside Drive, Route 111 in Atkinson, New Hampshire: This public water supply system consists of three water wells (PWS



ID#0112100-001, #0112100-002, and #0112100-003) each at a depth of 600 feet.

- ◆ Stage Road Junction located at 213 Stage Road in Hampstead, New Hampshire: This public water supply system consists of a well (PWS ID#1036040-001) at a depth of 280 feet.
- ◆ Consolidated Plastechns, Inc. located at 184 Route 111, Hampstead, New Hampshire: This public water supply system consists of a well (PWS ID#1036030-001) at a depth of 260 feet.

JJA is not shown to be located within a 0.25 mile radius of any of these public water supply systems.

#### *RCRA Inventory*

JJA is listed as a RCRA site with RCRA # NHD980909451. A total of seventeen other RCRA sites are listed as being located within a 1.0 mile radius of JJA. Two other site are listed as being located within a 500 foot radius of JJA. They are:

- ◆ Alliant Specialty Metal located at 134B Route 111, Hampstead, New Hampshire (#NHD000002518); and
- ◆ Land and Sea, Inc. located at Route 111, Hampstead, New Hampshire (#NHD986472306).

A total of nine other RCRA sites are listed as being located within a radius of 0.5 mile of JJA. They are:

- ◆ Rockingham Boat Repair located at Gigante Drive Industrial Center, Hampstead, New Hampshire (#NHS000001371);
- ◆ Pro Finishing at Gigante Drive, East Hampstead, New Hampshire (#NHD981891187);
- ◆ Lauzun Corp. located at 17 Gigante Drive, Hampstead, New Hampshire (#NHS000002494);
- ◆ Auto Electric Services, Inc. located at Gigante Drive, Hampstead, New Hampshire (#NHD982745499);
- ◆ Hampstead Machine located at 7 Gigante Drive, Hampstead, New Hampshire